
Brookhaven
National Laboratory
U.S. DEPARTMENT OF
ENERGY
2024 Site Environmental Report (Vol.1): An Overview
Community Advisory Council
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@BrookhavenLab

About This Year's Cover

- This year's cover features an image of the glossy ibises wading in a waterlogged field adjacent to the NSLS-II.
- On Long Island, it can be found along the south shore from April through August, but it is a rarity inland and at the Lab.
- They originate from Africa, and in ancient Egypt, ibises were considered sacred and a representation of the god Thoth – the god of the moon, science, mathematics, and patron of scribes.

2024 SER Table of Contents & Chapter SME's

- **SER Volume I**
  - Executive Summary (L. Brooks)
  - Chapter 1 – Introduction (L. Brooks/A. Engel)
  - Chapter 2 – Environmental Management System (D. Bauer)
  - Chapter 3 – Compliance Status (J. Remien)
  - Chapter 4 – Air Quality (D. Carlson)
  - Chapter 5 – Water Quality (J. Haskins)
  - Chapter 6 – Natural and Cultural Resources (K. Schwager, A. McGovern)
  - Chapter 7 – Groundwater Protection (B. Barth/D. Paquette)
  - Chapter 8 – Radiological Dose Assessment (T. Welty)
  - Chapter 9 – Quality Assurance (L. Singh)

- **SER Volume II**
  - Groundwater Status Report
    - Groundwater Protection Group

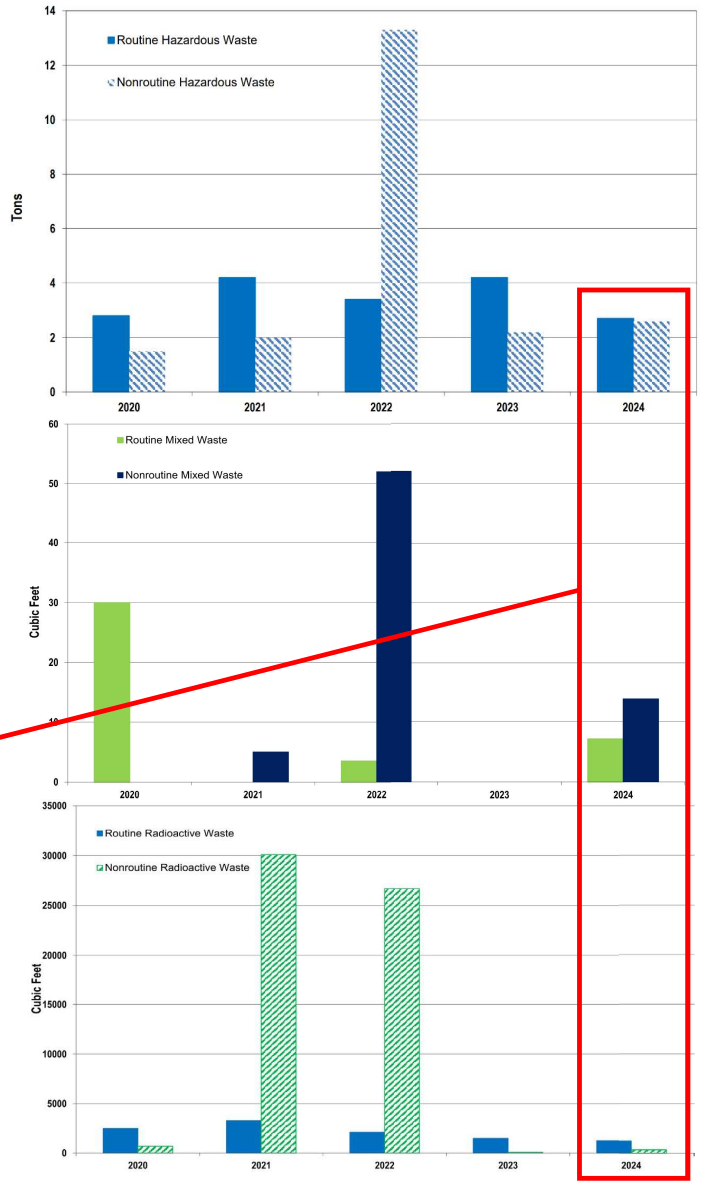
Chapter 2 - Environmental Management System (EMS)

- **External certification assessment was conducted to determine BNL's conformance to the ISO14001 EMS Standard**
  - The system remains fully integrated and effective
  - No nonconformances or OFIs were identified
  - BNL's EMS is certified through September 2027
- **Pollution Prevention (P2) Program**
  - The P2 Program provided $18K of funding for 14 proposals
  - Cost avoidance or savings of over $1.6 million
  - Approximately 1,500 tons of materials being reduced or reused
  - Landfill diversion rate: 86% (DOE Goal – 50%)
  - Received Green Electronics EPEAT Award, ninth DOE GreenBuy Gold Award, and a fifth GreenBuy Superior Award
  - Received BNL's first GreenSpace Silver Award

Chapter 2 - Waste Generation

- Routine hazardous waste within typical fluctuations
- Small amount of mixed waste was generated from facility maintenance activities and demolition activities during 2024
- Routine radioactive waste generation is mostly from medical isotope production with very little nonroutine waste generated as no radiological facilities were decommissioned

2024	Routine	Nonroutine
Hazardous	2.7 Tons	2.6 Tons
Mixed	7 ft^3	14 ft^3
Rad	1,226 ft^3	344 ft^3



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Chapter 2 – Monitoring and Measurement

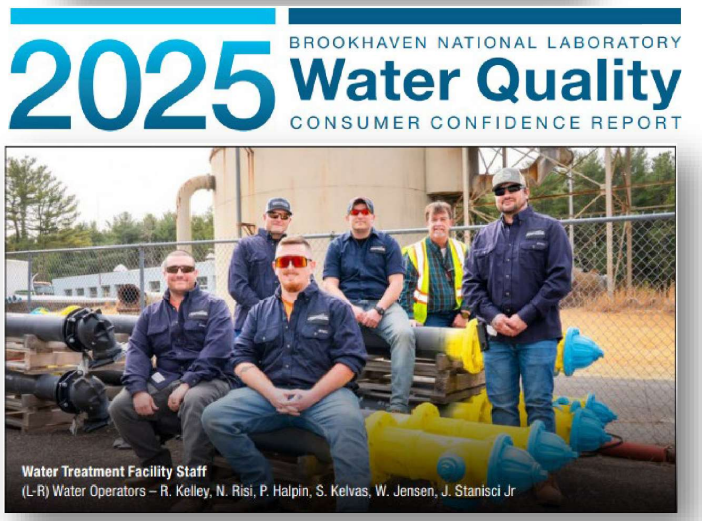
- BNL's EMS includes an Environmental Monitoring Program (EMP):
  - A comprehensive, site-wide program that identifies potential pathways for exposure of the public and employees
  - Evaluates the impact activities have on the environment
  - Ensures compliance with environmental permit requirements.
- Field Sampling Team performed **6,791 sampling events** of groundwater, potable water, precipitation, air, flora and fauna, soil, sediment, and discharges

Chapter 3 - Compliance Status Overview

- **BNL must comply with multiple permits, including Title V, NESHAPS, SPDES, Tank Storage, Well Permit, and RCRA**
  - No new or updated permits in 2024

- **172 proposed projects reviewed for NEPA**
  - 168 projects were considered minor actions requiring no additional documentation
  - Three projects required submittal of notification forms to DOE and determined to be covered by existing "Categorical Exclusions" or fell within scope of a previous environmental assessment
  - One EA was completed for the Clinical Alpha Radionuclide Production Facility (Finding of No Significant Impact)

- **Potable Water**
  - Usage increased from 2023 (409 MG vs. 335)
  - Notice of Violation (NOV) received for failing to submit a Completed Works application to the SCDHS before the relocated water main was placed into service to accommodate construction of Bldg. 748 in 2020
    - To satisfy violation, BNL provided the necessary Completed Works application within 60 days and coordinated a final inspection with SCDHS



"BNL's drinking water supply and distribution system were in full compliance with all county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting in 2024"

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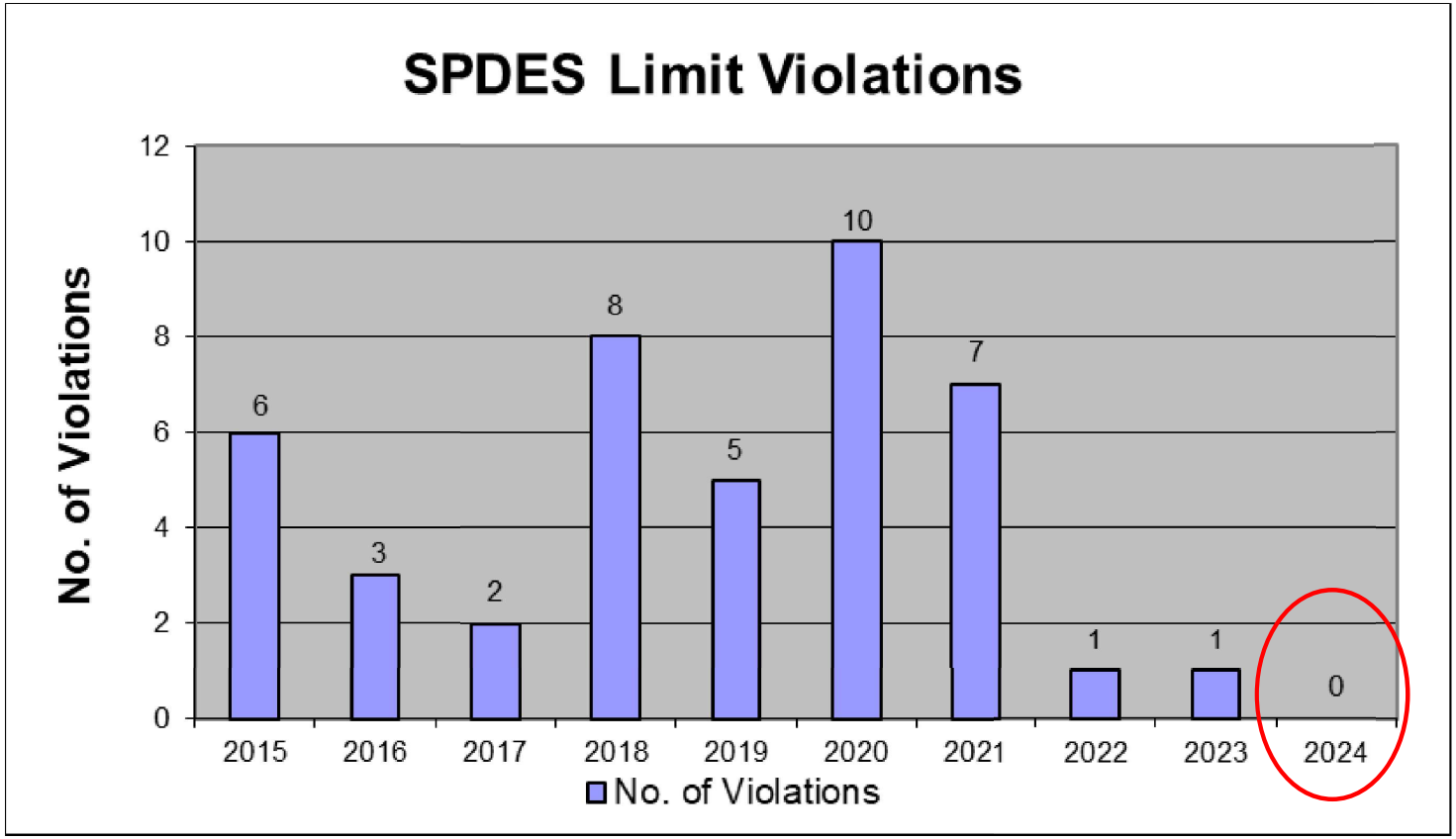
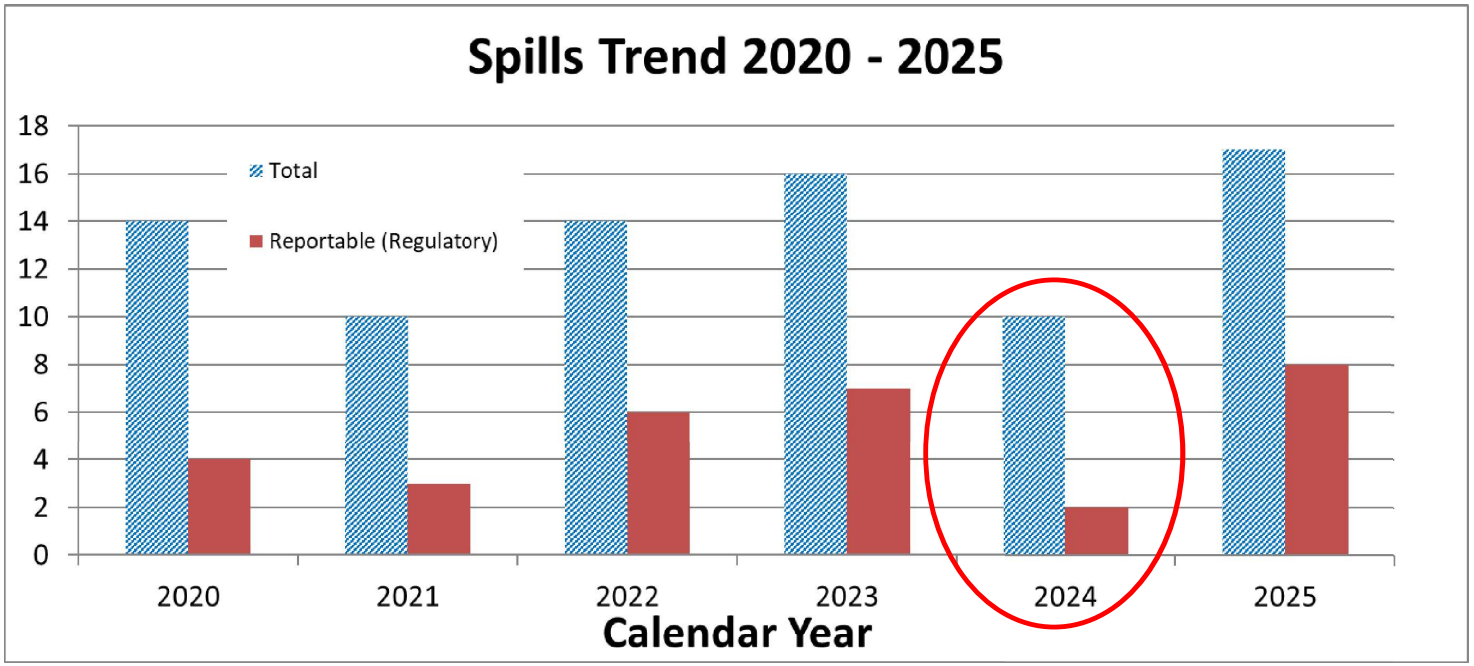
Chapter 3 - Overview (continued)

- **SPDES**



Chapter 3 - Spills and Reportable Incidents

- **10 spills in 2024**
  - Two of those spills met regulatory criteria
    - Most were less than a gallon, related to mechanical issues (e.g., hydraulic hose failures, failed fittings, vehicle gas tank), and were cleaned up immediately



Chapter 3 - Inspections and Assessments

External Inspections

- **U.S. EPA (RCRA):** In June, The U.S EPA conducted an inspection of RCRA hazardous waste activities. A closeout letter was received in September indicating that there were no violations/concerns from the inspection
- **U.S. EPA (UST):** In August, U.S. EPA performed an inspection of the Lab's Federally-regulated USTs. A letter documenting the inspection was received declaring no violations were observed
- **SCDHS (STP, potable water):** No issues identified during SPDES inspections and corrective actions for any minor deficiencies identified during potable water system inspection were established and communicated with SCDHS and were addressed by the Laboratory's Energy & Utilities Division

Chapter 3 - Inspections and Assessments

- **DOE Assessments/Inspections**
  - BHSO performed 4 surveillances of Waste Management (WM) activities with the purpose of evaluating performance in accordance with existing Technical Work Documents (TWDs) or Standard Operating Procedures (SOPs)
    - Surveillance identified two level 3 findings
  - BHSO also participated as an observer of Brookhaven Science Associates (BSA) Multi-Topic Assessment of BNL's environmental protection programs

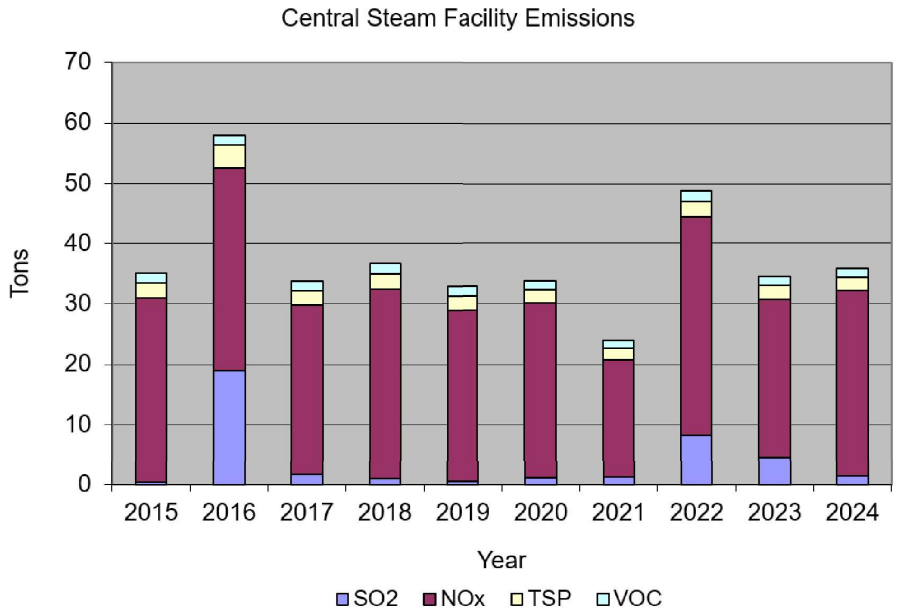
- **Internal Assessments (Environmental Multi-Topic)**
  - The Environmental Protection Division planned for and executed a programmatic self-assessment on the Labs management of hazardous and universal waste
  - Objective: Assess the effectiveness of BNL's hazardous/universal waste program and its compliance with the Standards Based Management System (SBMS) Waste Subject Area and WM procedural requirements
  - Concluded that program compliant with the relevant requirements and resulted in:
    - Four Strengths, six (6) Level 2 (minor) Findings, and nine (9) Opportunities for Improvement
    - Minor findings were addressed immediately and corrective actions for the identified opportunities for improvement identified and tracked to closure

Chapter 4 - Air Quality (Radiological)

- **Radiological Emissions Monitoring**
  - **Three facilities monitored for radionuclide releases:**
    - BLIP, Radioisotope Research and Production laboratory (RRPL), and HFBR
    - Total radionuclides released in 2024: **22,040 Ci** (29,813 Ci in 2023)
      - BLIP emissions of short-lived radioactive gases O-15 and C-11 accounted for 99.9% of total (Half life: O-15 = 122 seconds, C-11 = 20.4 min)
- **Ambient Air Monitoring**
  - **Radiological air quality monitored at four on-site locations around the perimeter of the site**
    - Gross alpha and beta concentrations consistent with natural background
    - Average tritium concentrations at or less than typical method detectable concentration (MDC)

Chapter 4 - Air Quality (Non-Radiological)

- **Continuous Emissions Monitoring System required for Central Steam Facility Boilers 6 & 7**
  - One NO_x limit exceedance for Boiler 6
  - Three (3) 6-min period opacity exceedances. Two (2) for Boiler 6, one (1) for Boiler 7
  - SO_2 , NO_x, TSP, and VOC emissions well under respective permit limits of 445, 159, 113.3, and 39.7 tons
  - Continuing to manage a 2023 Environmental Conservation Law restricting the use of #6 fuel oil



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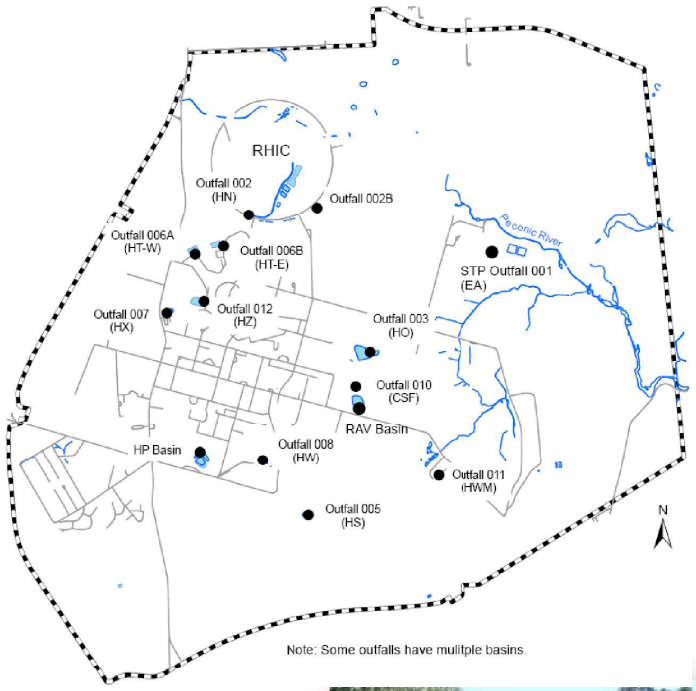
Chapter 5 - Water Quality (Radiological Monitoring)

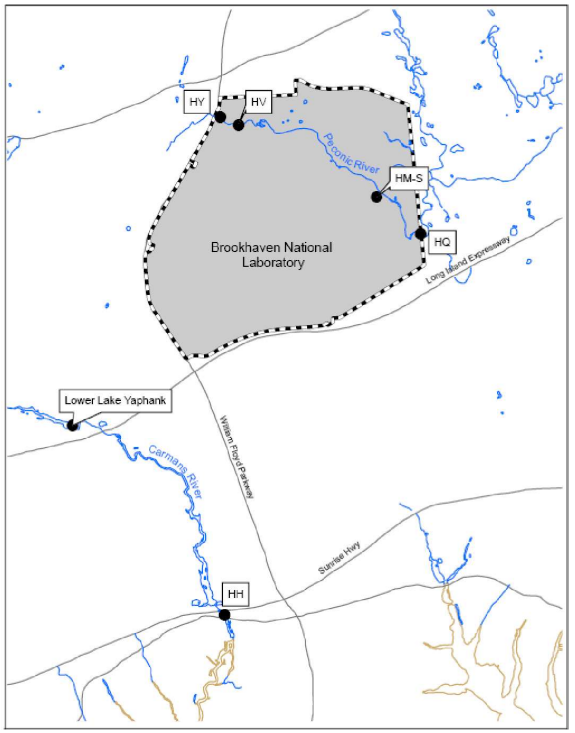
- Tritium (H-3) generally less than minimum detectable concentration (MDC) in all sample locations (Average MDC ~450 pCi/L)
  - H-3 was detected once above the MDC at the Sewage Treatment Plant (STP) in September (1,018 ± 300 pCi/L)
  - Annual average effluent concentration at STP was 98.3 ± 66.5 pCi/L
  - All well below the Drinking Water Standard of 20,000 pCi/L
- No gamma-emitting radionuclides attributable to Laboratory operations were detected
- Low flow in the Peconic River continued in 2024
  - Radiological analysis of surface water samples had very low concentrations of gross beta activity that were attributed to natural sources



Upstream of Monitoring Station HQ

Chapter 5 – Water Quality (Non-Radiological Monitoring)

- **Sewage Treatment Plant**
  - Full compliance was met entire year
- **Recharge Basins**
  - All metals complied with the respective water quality or groundwater discharge standards
  - VOCs – low concentrations of disinfectant by-products (bromine and chlorine) seen in all basins. Basin HT-W had the highest concentration of 5.4 µg/L, well below the 50 µg/L DWS
  - All water quality analytes were within effluent standards
- **Peconic River**
  - There was one period of off-site flow after heavy rains, spring of 2024
  - Some metals (aluminum, copper, lead, and iron) were present in concentrations that exceeded water quality standards
    - Iron and aluminum are attributable to natural sources
    - Filtration of samples often showed source of inorganics to be suspended sediment
  - No VOCs detected above minimum detection limits (MDLs)
  - Water quality data was consistent for locations sampled



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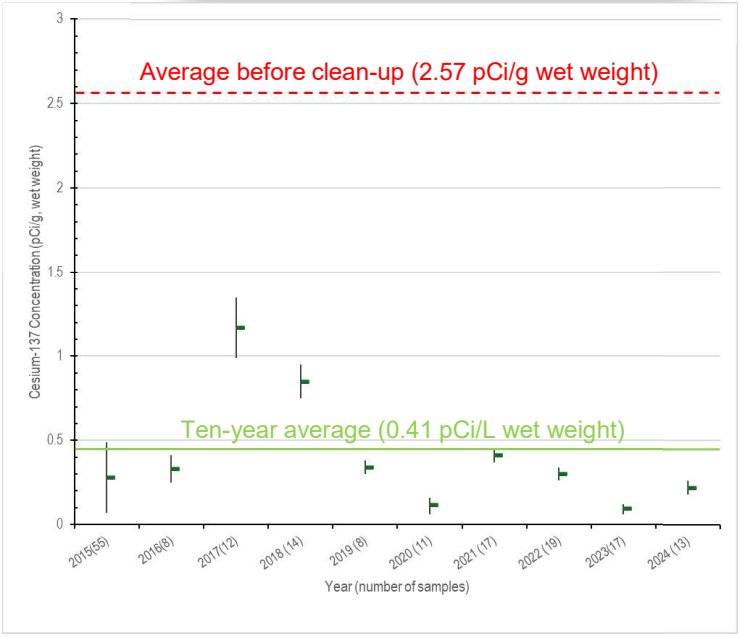
Chapter 6 - Natural and Cultural Resources

- **Natural Resource Management**
  - Deer Management
    - Beginning of 2024 population ~350 deer
    - Two separate culls resulted in the removal of 123 deer
  - One prescribed fire (3.5 acres) attempted in April 2024, shut down due to control issues
  - Five nights of mist-netting for bats conducted in July
  - Eleven SULI interns worked on bat acoustic monitoring, small mammal trapping, black turpentine beetle activity in pitch pine restoration treatments, fire and insect communities in pine barrens, wildlife camera trapping, and the impacts of fire and forest microclimates on tick populations

- **Surveillance Monitoring**
  - Cs-137 in deer had similar results as past years - highest value 0.42 pCi/g, wet weight (East Fire Break)
  - Ten-year trend shows decline; 2024 on-site average in meat was 0.22 pCi/g, wet weight, with ten-year on-site average being 0.41 pCi/g, wet weight
  - Average of 12 deer samples taken in cull was 0.06 pCi/g, wet weight



Ten-year trend in Cs-137 in deer flesh for samples taken at BNL and within 1 mile of the Laboratory

Chapter 6 - Cultural Resource Management

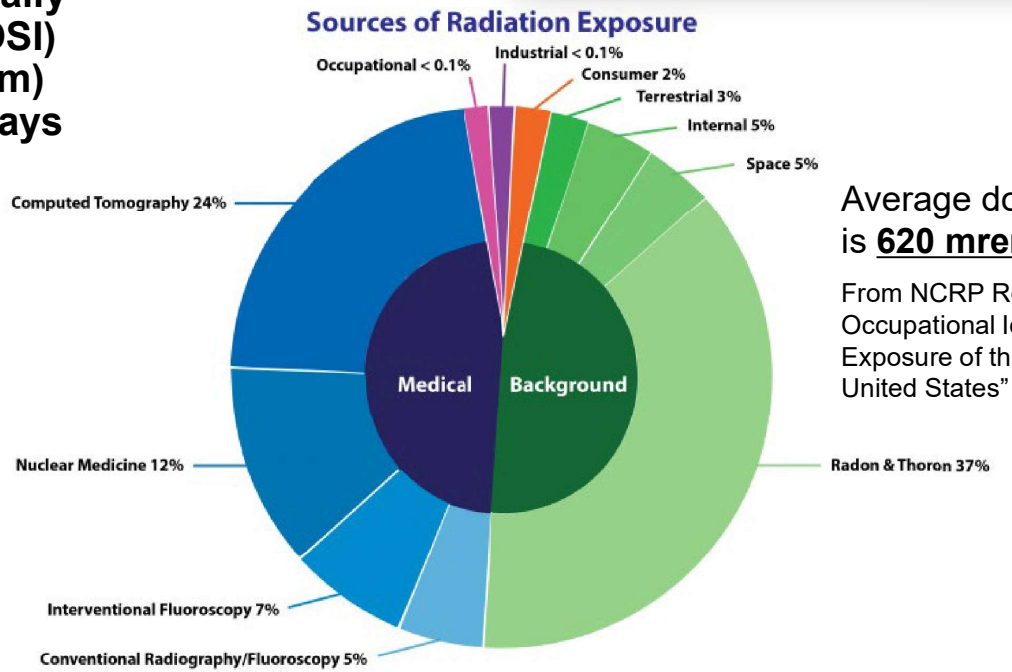
- BNL hired first full-time Cultural Resource Manager
- Artwork and content developed for kiosks to meet compliance with Memoranda of Agreement (MOA)
- Outreach and support to Bellport-Brookhaven Historical Site for *Innovators* exhibit
- Museum cases installed in Berkner Hall

WWI-era gas mask exhibited in new museum case in Berkner Hall.

Chapter 8 - Radiological Dose Assessment

- **Ambient external dose (TLDs)**
  - 64 mrem on site and 62 mrem off site (includes cosmic and terrestrial background)
  - No external dose contribution from BNL operations
- **Total effective dose to the Maximally Exposed Off-site Individual (MEOSI) in 2024 from inhalation (1.67 mrem) and ingestion (0.61 mrem) pathways was <u>2.28 mrem</u>**
- **Well Below Regulatory Limits**
  - EPA: 10 mrem/year (air pathway)
  - NYSDOH: 10 mrem/year (ingestion pathway)
  - DOE: 100 mrem/year (from all pathways)

TLD in a tree at the Longwood Estate.



Average dose to individual is **<u>620 mrem/year</u>**

From NCRP Report No. 160, "Non-Occupational Ionizing Radiation Exposure of the Population of the United States" (2009)

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